OUR ASTRONOMICAL COLUMN.

BRIGHT METEOR.—Mr. Denning at Bristol saw a bright meteor of about first magnitude at 11h. 12m. on June 2 with path from 301°+50° to 265°+55°, and directed from the shower of Pegasids at 334°+28°, to which he recently directed attention in NATURE. The meteor left a streak of about 10° amongst the stars of Cygnus and Draco. At Bristol the midnight sky of June 2 was magnificent, the stars being unusually bright and the firmament remarkably dark, and comparable with some of the evenings of early autumn.

THE TOTAL SOLAR ECLIPSE OF MAY 8, 1910.—In a letter to the *Observatory*, Mr. J. F. Tennant points out the availability of Tasmania as an observing station for the eclipse of the sun due to take place on May 8, 1910. The duration of the total phase will be something like three minutes, but the sun will, at most places, apparently be at a low altitude; in fact, except at the extreme N.W., the sun sets partially eclipsed. Particulars as to times are given in the letter, and the writer states his intention to obtain particulars concerning the climatic probabilities, &c. (the *Observatory*, No. 397, p. 250, June).

THE DARK D_3 LINE IN THE SUN.—In the June number of the *Observatory* (p. 250) Mr. Buss returns to the discussion anent the presence of the helium absorption line in the solar spectrum. Among other things, he points out that, according to Mr. Evershed's recent letter, the position of the dark D_3 line is now given as being on the red side of the bright chromospheric line, whereas it was previously stated to be on the more refrangible side.

Mr. Buss adds that of 358 observing days in 1906 and 1907 he made spectroscopic observations on 317 days, and was able to detect the D_3 absorption on 236 days, or on about 75 per cent. of the total number. This indicates that the phenomenon of helium absorption over active solar areas is not so rare as has been thought, and Mr. Buss suggests that, with a more refined equipment than his, a practical permanency of the phenomenon over such areas, with or without spots, might be established.

It is interesting to note with regard to this that at the meeting of the British Astronomical Association held on April 29, Father Cortie expressed the opinion that for this class of work a telescope of not very large aperture and a spectroscope of moderate dispersion were required.

POSITION OF THE AXIS OF MARS.—In No. 4251 of the *Astronomische Nachrichten* (p. 39, May 29) Prof. Lowell gives the results obtained from his measures of the position of the axis of Mars during 1907. Between September 23 and December 16, 1907, 198 determinations of the position-angle of the south polar cap were made by Prof. Lowell and seventy-nine by Mr. Lampland. The measures were made in three different ways:—(1) with the micrometer thread cutting off equal segments below the cap; (2) with the thread tangent externally to the cap; and (3) with the thread tangent internally to the cap, and on collating the results it was seen that each method is subject to systematic errors. To throw some light on the question of these errors, an artificial planet was devised by Mr. Lampland on which measures were made by both observers, under conditions as far as possible identical with the true conditions. The results of these observations showed that the dichotomy measures are more trustworthy than the tangential, that they are decreased by phase, and that the tangency measures are too large.

Combining the results for the measures made during 1901–7, Prof. Lowell obtains as the general mean for the position of the axis R.A.=315° 38′, dec.=54° 39′, and for the obliquity of the Martian ecliptic 23° 8′. He then gives a table comparing his results with others obtained since 1781, and points out that there is apparently a steady decrease in the obliquity if Cerulli's observations of 1896–7 be excepted; of this phenomenon he offers no explanation.

THE ORBIT OF α ANDROMEDÆ.—From spectrograms taken at the Potsdam Observatory during the period 1901–7, Herr Ludendorff determined an orbit for the spectroscopic binary α Andromedæ, and now publishes his discussion in No. 4250 of the *Astronomische Nachrichten* (p. 23, May 21). For the period he finds 96·7 days, a value which he considers certain to within 0·1 day. In the discussion he confirms Sir Norman Lockyer's remarks as to changes in the spectrum, and records that he has on several plates observed the Mg line at λ 4481 doubled.

THE ECCENTRICITIES OF COMET ORBITS.—In No. 113, vol. xix. (pp. 67–71), of the Publications of the Astronomical Society of the Pacific, which we have just received, there is an interesting address by Prof. Leuschner on the probable general form of comet orbits. Prof. Leuschner raises strong objections against the prejudice which assumes all cometary orbits to be parabolic unless it can be proved very certainly that they are elliptic or hyperbolic. In support of his suggestion that the parabola may be the exception, and not the rule, he gives two tables, the first of which shows the percentage of parabolic orbits of comets appearing in three different periods. For the last period (1846–95) only 54 per cent. of the determined orbits had the eccentricity 1·0, and therefore it seems no more probable that a comet's path should be parabolic than that it should not. The second table classifies the orbits according to the duration of visibility of the comets, and here it appears that the longer the comet is observed the more probable it becomes that the orbit cannot be satisfied by a parabola. Of comets observed for more than 240 days, it is doubtful whether any had parabolic orbits.

THE ROYAL OBSERVATORY, GREENWICH.

THE annual visitation by the Board of Visitors of the Royal Observatory, Greenwich, was held on Wednesday, June 3, when the customary report was presented by the Astronomer Royal dealing with the work carried out during the twelve months ending 1908 May 10. A summary of the chief points of the report is given below.

Among other matters, it is interesting to note that various national undertakings of importance were, or are being, facilitated by the loan of instruments by the observatory authorities. Thus the observers attached to the British Antarctic Expedition (1907) are using the 4-inch Simms' telescope No. 2, Captain Monro, R.N., used the transit instrument D in the determination of the longitude of Ascension, whilst a very interesting collection of historical and modern astronomical and meteorological instruments, models, photographs, &c., illustrating the past and present work of the observatory, is being exhibited in the Science Section of the Franco-British Exhibition.

Referring to the work done with the transit circle, the report states that the system of inclined wires formerly used has been replaced by a system of two close vertical wires and one horizontal wire, and the method employed for illuminating the field has been changed to that applied so successfully to the altazimuth last year. A series of observations is now being carried out in order to compare the results obtained under the respective conditions of illumination, and it is hoped that a discussion of the results may throw some light on the question of the magnitude equation in the observation of the fainter stars.

The transit was employed for the usual observations of the sun, moon, planets, and fundamental stars, the working list being made up by the inclusion of stars of the ninth magnitude and brighter between the parallels of north declination +24° to +32°, which will serve as reference stars for the Oxford astrographic zones. Eight thousand seven hundred and twenty-three transits and 7960 circle observations were taken during the year.

From the observations made in 1905, applying Bessel's refractions, 38° 31′ 21″·70 was determined as the co-latitude, whilst those made in 1906, with Pulkowa refractions, gave the value 38° 31′ 21″·67. The reduced solar observations of 1906 show the correction to the tabular values for the obliquity of the ecliptic to be −0″·09, and the observations of the summer and winter solstices indicate that the mean of the observed distances from the pole to the ecliptic is apparently 0″·005 too great.

Each day, when practicable, three or more observations of level and nadir were made, and it was found that the diurnal changes of level ranged from +0″·13 at noon, to 0″·00 at 6 p.m., to +0″·18 at midnight; the corresponding values for the nadir were found to be +0″·17, 0″·00, and

+0″·14. The mean error of the moon's tabular place, determined from eighty-two observations and computed from Hansen's tables with Newcomb's corrections, was −0·383s. in R.A. and −0″·15 in N.P.D. for 1906. From 104 observations in 1907 the error is −0·401s. in R.A.

Part i. of the Second Nine-year Catalogue, epoch 1900, dealing with fundamental and zodiacal stars, is already in the printer's hands, and part ii., giving the astrographic reference stars, will be ready for the press shortly.

The new method of illuminating the altazimuth field, as described in the previous report, has proved very satisfactory, and has now been adapted to the transit instrument. The altazimuth was used for meridian and extra-meridian observations throughout the year, and the observations of the lunar crater Mösting A, commenced in 1905, were continued whenever practicable; these serve to connect the observations of the first and second limbs made before and after full moon, and, when discussed with the similar observations that are being made at the Cape Observatory, will provide data for the determination of the lunar parallax. Forty-three observations of the N.P.D. and of the R.A. of the crater were made during the year. That both the transit-circle and altazimuth observations are satisfactory is shown by their agreement.

From the altazimuth observations in 1907 the mean errors of the moon's tabular place are:—moon's limb, in meridian, −0·36s.; Mösting A, in meridian, −0·35s., moon's limb, extra meridian, −0·42s.

The larger scheme of reflex-tube observations, mentioned in the preceding report, was prosecuted throughout the year, 1545 double and forty-four single observations being made; the total number of stars observed, including β and γ Draconis and i^2 Cygni, which are observed throughout the year, was eighty-five. With the view of determining the variation of latitude, the discussion of the observations from 1903 onwards has been commenced, but owing to the variation of the instrument's scale value from night to night, caused by minute alterations in the distance between the mercury surface and the object-glass, there are serious difficulties to be overcome in the discussion. This distance can be adjusted to within about 0·01 inch by means of the focussing rod, but an error of that amount would introduce errors quite inadmissible in the deduced zenith distances of the stars at a distance from the centre of the field. For example, in the case of β Draconis, which is 53½′ from the zenith, the error would amount to ±0″·56.

The 28-inch refractor was employed for observing double stars, primarily those pairs discovered by Mr. Hough, and measures were made on 105 nights as compared with eighty-six nights last year; κ Pegasi was measured on fifteen, δ Equueli on thirteen, and 70 Ophiuchi on sixteen nights. Complete sets of measures of the polar and equatorial diameters of Jupiter were made, first with the filar and then with the double-image micrometer, on seventeen nights, whilst with the filar micrometer the diameters of the satellites were determined on two nights.

It was mentioned in the last report that a system of twelve lignum-vitæ wedges had been employed to fix rigidly the mirror of the 30-inch Thompson reflector. Whilst the method has proved very satisfactory in fixing the mirror, there is a tendency to produce slight distortion, so it is proposed to introduce a further modification of the support the next time the mirror is dismounted for re-silvering. Cast-iron blocks, shaped to fit the steel supporting band round the edge of the mirror, are to be introduced, the pressure being applied by screws passing through the cell; in this way the strain may be adjusted as required.

Thirty-one photographs of Neptune and its satellite were secured with the 26-inch refractor, using the occulting shutter as in previous oppositions, on sixteen nights; photographs of Saturn's, and of Jupiter's distant, satellites were also taken. In regard to the latter, Mr. Melotte and the Greenwich observers generally are to be heartily congratulated upon the discovery of Jupiter's eighth satellite, first noted on a photograph taken on February 28. Altogether twelve photographs showing this object were secured between January 27 and April 24, and the measurements show that the newly discovered satellite is very much more distant from Jupiter than the sixth and seventh satellites, and is perhaps not quite so faint as the seventh. Of J. vi. and vii., respectively, thirty-eight and twenty-two photographs were secured during the opposition.

The 30-inch reflector was also used to photograph fifty-four minor planets, and comets 1907*d* and *e*. Several long exposures on comet 1907*d* (Daniel) produced negatives in which the structure of the tail is of great interest. Four long exposures were made in an unsuccessful search for Halley's comet, and this search, for which an ephemeris, based on the perturbations calculated at Greenwich, has been prepared, will be resumed during the coming autumn.

With the astrographic equatorial, 128 satisfactory plates were taken during the year to replace plates which, although satisfactory in other respects, are unsuitable for reproduction of large prints. Positives have been made and passed for 192 plates which cover the zones 75°–78°, and 109 plates in zones between 79° and the pole. Only fifteen chart plates remain for reproduction, and these have to be replaced by more suitable negatives.

The work of the Greenwich section of the Astrographic Catalogue is complete so far as the publication of the measured rectangular coordinates and the data necessary to convert them into Right Ascension and Declination is concerned. The conversion of the coordinates of such stars as are in Carrington's Catalogue has been commenced. Vol. ii. of the Greenwich Astrographic Catalogue was published during the year, and contains 98,738 stars. The report contains an interesting table, too large to reproduce here, comparing the number of stars which appear on the plates for each zone and for the three different exposures, and also comparing these numbers with the number of stars shown in the same zones of the Bonn Durchmusterung; the total number of stars shown on the forty-minutes' plates is 719,088, or 344·4 per square degree.

The perturbations of Halley's comet, which are being computed by Messrs. Cowell and Crommelin, and the data necessary for determining the time of next perihelion passage, are nearly complete, but some further investigation of the close approaches of the comet to Jupiter in 1834 and 1837, when the perturbations appear to have been considerable, is necessary; 1910 April 8 appears to be the most probable date for the occurrence of the next perihelion passage. Mr. Crommelin has confirmed Dr. Hind's identifications of the comet with three exceptions (1223, 912, and 837), and the perturbations have been carried back to 760.

Photographs of the sun were taken with the Thompson photoheliograph on 210 days, and with the Dallmeyer photoheliograph alone on two days.

Some remarkable fluctuations of the solar activity during 1907 are reported. From July onwards an increased activity occurred, and several naked-eye groups were observed.

The usual magnetic observations were carried out during the year, and the principal results for the magnetic elements for 1907 are given as follows:—

Mean declination	15° 59′·8 West
Mean horizontal force ...	4·0195 (in British units) 1·8533 (in metric units)
Mean dip (with 3-in. needles),	66° 56′ 4″

In 1907 there was one day of great magnetic disturbance and sixteen of lesser disturbance.

The meteorological results show that the summer of 1907 was exceptionally windy, and that the mean temperature of the year was 49°·4, or 0°·2 below the average of the sixty-five years 1841–1905. The rainfall of the year ending 1908 April 30 was 23·14 inches, being 0·98 inch below the sixty-five-year average.

The testing of chronometers and chronometer watches showed a serious falling off in the performance of the former and an improvement in that of the latter instruments.

The danger which threatened the observatory from the working of the L.C.C. generating station on the northern meridian has been averted to a great extent by the two years' working agreement with the Council. Apparently the close, double-star observations with the 28-inch refractor are not affected prejudicially, but it is still desirable that the trouble arising from the outflow of heated gases, which interfere with the observation of northern stars on the meridian, should be mitigated.